REMARKS

In the Official Action mailed on **9 August 2007**, the Examiner reviewed claims 1-21. Claims 1 and 8 were objected to because of informalities. Claims 1-21 were rejected under 35 U.S.C. § 102~~3~~(e) based on Golden et al. (USPN 6,973,517 hereinafter "Golden").

Claim Objections

Examiner objected to claims 1 and 8 because of informalities. Specifically, Examiner objected to "a given network" in claims 1 and 8.

Applicant has amended claims 1 and 8 to clarify that "a given network" refers to "a given communication network."

Rejections under 35 U.S.C. § 102(e)

Examiner rejected claims 1-21 under 35 U.S.C. § 102(e) as being anticipated by Golden. Applicant respectfully disagrees. The Golden system is limited to communication using only 6 inter-processor signal lines between central processing units (CPUs) in a symmetrical multiprocessor (SMP) system (see Golden, FIG. 1 and col. 6, lines 43-51). Nothing in Golden discloses a network system in that avoids communication deadlocks without additional: (1) restrictions on moving data or (2) network connections.

The Golden system includes a set of processor modules that each comprise two CPUs with connections for 6 inter-processor (IP) network ports (see Golden, FIG. 1 and col. 6, lines 43-51). The processor modules are coupled in a so-called "Manhattan grid" arrangement. The network ports for each processor module are referred to as North (N), South (S), East (E), and West (W). As can be seen in Golden's FIG. 1, the network ports for each processor module are restricted to: (1) a single **input port and a single output port in the WE direction** (i.e., left to

right in the figure), (2) a single **input port and a single output port in the EW direction**, and (3) a single **input port and a single output port in the NS direction**. As described in the related art section of the instant application, such grid networks can be susceptible to deadlock conditions (see instant application, par. [0005]). In order to avoid deadlocks that naturally arise in such a routing scheme, Golden describes either: (1) routing messages through "virtual channels" (i.e., additional routes), or (2) forcing all messages to route in one dimension before routing any other messages in the next dimension (e.g., all messages route EW before any messages route NS) (see Golden, col. 10, lines 56-66).

In contrast, embodiments of the present invention include separate networks the move data **unidirectionally in only orthogonal dimensions** (see instant application, par. [0028]). In other words, each network moves the data in only one of the two directions in each orthogonal dimension (e.g., in a 2-dimensional grid; E *or* W, and N *or* S), so each network enables a unique and non-conflicting set of potential data movements. Using the grid in FIG. 1 of the instant application as an example, network 202 (see FIG. 2 of the instant application) moves data only N and E, network 204 moves data only N and W, network 206 moves data only S and W, and network 208 moves data only S and E. Because the distance from source to destination increases monotonically as the data is routed along the network, there can be no cycles in the graph and thus, **deadlocks are avoided**. Moreover, in embodiments of the present invention, routing occurs **dynamically**, which enables the system to take advantage of less-loaded network routes (see instant application, par. [0036]-[0038]).

In addition, Examiner avers that Golden's "dimension order routing" anticipates the following language from claim 1 of the instant application:

> a plurality of communication networks coupling the n-dimensional grid of integrated circuit devices, wherein a communication network of the

> plurality of communication networks moves data in only orthogonal dimensions.

Applicant respectfully disagrees. The dimension order routing disclosed by Golden "requires that a message route along a **fixed path** from source to destination" (see Golden, col. 11, lines 5-7). Golden also discloses "minimal adaptive routing," which enables a system to adaptively route a message. However, Golden's deadlock free adaptive routing requires an "adaptive network of buffers" coupled to a "deadlock free network," wherein messages transition out of the set of adaptive buffers (and away from the minimally-adaptive routing network) to the deadlock free network when encountering "a situation that might lead to deadlock" (see Golden, col. 11, lines 11-25)

The Golden system is limited to communication using 6 inter-processor signal lines between central processing units (CPUs) in a symmetrical multiprocessor (SMP) system. Nothing in Golden discloses a network system that avoids communication deadlocks without additional: (1) restrictions on moving data or (2) additional outside network connections.

Applicant has amended independent claims 1, 8, and 15 to clarify that in embodiments of the present invention include a plurality of separate networks that move data **unidirectionally in only orthogonal dimensions**. These amendments are supported by FIG. 1, FIG. 2, and par. [0028] of the instant application. No new matter has been added.

Hence, Applicant respectfully submits that independent claims 1, 8, and 15 as presently amended are in condition for allowance. Applicant also submits that claims 2-7, which depend upon claim 1, claims 9-14, which depend upon claim 8, and claims 16-21, which depend upon claim 15, are for the same reasons in condition for allowance and for reasons of the unique combinations recited in such claims.

CONCLUSION

It is submitted that the present application is presently in form for allowance. Such action is respectfully requested.

Respectfully submitted,

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